National Aeronautics and
Space Administration

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NASA-STD-2804L
Effective June 24, 2008

MINIMUM INTEROPERABILITY SOFTWARE SUITE

NASA TECHNICAL STANDARD

FOREWORD

This standard is approved for use by NASA Headquarters and all NASA Centers and is intended to provide a common framework for consistent practices across NASA programs.

The material covered in this standard is governed and approved by the NASA Information Technology Management Board. Its purpose is to define the baseline software suite necessary to support interoperability both between NASA end user computers and within the NASA operating environment. The standard establishes Client Reference Configurations, Operating System Standards, and Compliance Dates for computers running Microsoft Windows, Apple Mac OS, and various Linux and UNIX operating systems. Adherence to this standard ensures compliance with federal requirements for desktop computers, laptops, and other end user devices.

Requests for information, corrections, or additions to this standard should be directed to the John H. Glenn Research Center at Lewis Field (GRC), Emerging Technology and Desktop Standards Group, MS 142-5, Cleveland, OH, 44135 or to *desktop-standards@lists.nasa.gov*. Requests for general information concerning standards should be sent to NASA Technical Standards Program Office, ED41, MSFC, AL, 35812 (telephone 256-544-2448). This and other NASA standards may be viewed and downloaded, free of charge, from the NASA Standards web page: http://standards.nasa.gov/.

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Chief Information Officer

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1 SCOPE

1.1 Purpose

This standard defines the baseline software suite necessary to support interoperability both between NASA end user computers and within the NASA operating environment. The standard establishes Client Reference Configurations, Operating System Standards, and Compliance Dates for computers running Microsoft Windows, Apple Mac OS, and various Linux and UNIX operating systems Adherence to this standard ensures compliance with federal requirements for desktop computers, laptops, and other end user devices.

1.2 Applicability

Center CIO's will ensure that all NASA employees at their respective centers have access to an interoperable workstation that is equipped with a minimum software suite that meets the standards listed in Section 3 below.

The Client Reference Configuration (CRC) establishes required functionality and required products necessary to meet that functionality. Future procurements intended to address this functionality are restricted to the products defined in the CRC. Existing licenses for other products may not be renewed. Products will be added, replaced, or removed as appropriate to address agency interoperability requirements.

1.3 Waivers

The waiver process set forth in NPR 2800.1, paragraph 2.2.4, applies to this standard. The Emerging Technology and Desktop Standards group, in cooperation with the Office of the Chief Information Officer, will evaluate and process waivers as appropriate.

2 ACRONYMS AND DEFINITIONS

2.1 Acronyms

CA	Certificate Authority
CIO	Chief Information Officer
CIS	Center for Internet Security
CRC	Client Reference Configuration
DAR	Data at Rest (encryption)
ETADS	Emerging Technology and Desktop Standards
FDCC	Federal Desktop Core Configurations
FISMA	Federal Information Security Management Act
FTP	File Transfer Protocol
GIF	Graphics Interchange Format
HTML	HyperText Markup Language
ICA	Independent Computing Architecture
ICE	Integrated Cryptographic Engine
IMAP	Internet Message Access Protocol
JPEG	Joint Photographic Experts Group
JRE	Java Runtime Environment
MIME	Multipurpose Internet Mail Extension
NEF	NASA Electronic Forms
NIST	National Institute of Standards and Technology

NOCA	National Organization for Competency Assurance
NOMAD	NASA Operational Messaging and Directory Service
OMB	Office of Management and Budget
PDF	Portable Document Format
PKI	Public Key Infrastructure
SCAP	Security Content Automation Protocol
SMTP	Simple Mail Transport Protocol
SSL	Secure Sockets Layer
TCP/IP	Transmission Control Protocol/Internet Protocol
TLS	Transport Layer Security

2.2 Definitions

2.2.1 Desktop Computer

The term desktop computer is used generically to refer to traditional desktop systems as well as laptop computers, notebooks, tablets, engineering workstations, and similar platforms that are utilized to provide basic interoperability.

2.2.2 Support for Basic Interoperability

Systems supporting basic interoperability are defined as desktop computers used to exchange information electronically by end users that require any of the functionality listed in the Client Reference Configuration (Office Automation, Electronic Messaging, Web Browsing, etc. See section 3.3 Client Reference Configurations).

3 DETAILED REQUIREMENTS

3.1 Architectural Compliance Requirements

NASA has baselined and approved the NASA Integrated Information Technology Architecture[1]. The architecture is predicated on:

- The selection of standards for a broad and cost-effective infrastructure using commercial off-the-shelf and well-supported open source products to the greatest extent practical
- Interoperability both within and external to NASA
- Flexibility for future growth
- Consistency with generally accepted consensus standards as much as feasible.
- Among these objectives, ensuring interoperability is one of NASA's most critical issues related to information technology.

In many cases, it is in NASA's best interest to specify commercial products as standards for an interoperable implementation of a particular set of related and integrated functions. The products themselves often include additional functionality or proprietary extensions not specified by this standard. While these products can be used to create higher-level interoperability solutions, these solutions may not be recognized within the context of the NASA interoperability environment and may be deprecated without warning by future revisions to this standard. Users of this standard are advised to apply appropriate caution when implementing proprietary or non-standard extensions, features and functions that go beyond the explicitly stated standard functionality.

[1] NASA-STD-2814A, *NASA Integrated Information Technology Architecture—Technical Framework*

3.2 Agency Security Configuration Standards

The annual NASA Chief Information Officer Agency Security Standards letter establishes Agency FISMA compliance goals and reporting requirements for NASA systems, through the use of Agency Configuration Settings.

Compliance with the Agency Security Configuration Standards requires deployment of Federal Desktop Core Configurations (FDCC) settings to all NASA Microsoft Windows XP and Vista systems. Compliance for all systems for which FDCC security settings are not available requires the deployment of Center for Internet Security (CIS) Benchmarks.

3.3 Client Reference Configurations.

To address application, data, and infrastructure interoperability, and ensure compliance with federally mandated desktop computer configuration settings, the software functionality, applications, interface standards, configuration settings, versions, and deployment settings established by this standard are definitive.

Client Reference Configurations (CRC) are included for each operating system, with specific version and required configurations listed as appropriate. Interface standards are included to guide service providers and system integrators.

The Client Reference Configurations define the baseline upon which desktop service providers can define common enterprise images for all interoperable desktops computers. All IT initiatives funded or endorsed by the NASA OCIO account for systems that conform to the Client Reference Configurations. Application service providers and software developers can use the reference configurations to assist with integration and acceptance testing.

The NASA Emerging Technology and Desktop Standards group is working to ensure interoperability at the highest possible revision of products included in the Client Reference Configurations. Applications that meet these interface standards while providing improved end user experience, mitigating security risks, reducing support costs, or offering other tangible improvements may be submitted to desktop-standards@lists.nasa.gov for consideration in future revisions to these standards.

3.3.1 Client Reference Configuration for Windows XP

Client Reference Configuration for Windows XP					
Functionality	**Application**	**Interface Standard**	**Required Settings**	**Version**	**Effective Date**
Operating System	Windows XP Professional		FDCC[2]	Service Pack 2	September 30, 2008
	Windows XP Professional X64 Edition		FDCC[2]	Service Pack 2	April 1, 2009
Firewall	Windows Firewall		FDCC[2]	XP/SP2	September 30, 2008
Smartcard authentication	ActivIdentity ActivClient	ActivIdentity Proprietary	HDI specified settings[3]	6.1.x	October 1, 2009
PKI	Entrust ESP	Entrust Proprietary	NASA PKI Team specified settings	8.0.x	November 1, 2008
Trusted CA Certificates	See Section 3.6	X.509			June 24, 2008
Anti-virus	Symantec Antivirus		Enterprise update server	10.1.X	June 24, 2008
Anti-Malware	Symantec Antivirus		Enterprise update server	10.1.X	June 24, 2008
Patch Reporting	PatchLink (Update)	Lumension Proprietary	Configured according to local Patchlink server requirements	6.4.x	June 30, 2008
Data at Rest Encryption	SafeBoot		Configured to use central policy and key escrow service	5.x	April 1, 2009
.NET	.NET 2.0			2.0 SP1	June 30, 2008
Web Browser	Mozilla Firefox	W3C and industry standards, including the following: HTML 4.01 XHTML 1.0 CSS 2 (Cascading Style Sheets) ECMAscript (JavaScript) capability to run Java 2 applets, SSL version 2 and 3, TLS 1.0	Configured with CA certificates specified in Section 3.6	2.0.x	June 24, 2008
	Microsoft Internet Explorer		FDCC settings, CA certificates specified in Section 3.6	7.x	November 1, 2008
Office Automation	Microsoft Office (Professional Edition with Outlook)			2007 SP1	April 1, 2009
Word Processing	Microsoft Word	Microsoft Word 97-2003 document format	Configure to use Word 97-2003 file format by default	2007 SP1	April 1, 2009
Spreadsheet	Microsoft Excel	Microsoft Excel 97-2003 document format	Configure to use Excel 97-2003 file format by default	2007 SP1	April 1, 2009
Presentation	Microsoft PowerPoint	Microsoft Powerpoint 97-2003 document format	Configure to use Powerpoint 97-2003 file formats by default	2007 SP1	April 1, 2009

[2] Check http://etads.nasa.gov/ASCS/ASCS-FDCC.shtml for current configurations
[3] See Section 3.4.6 for additional information.

Client Reference Configuration for Windows XP					
Functionality	**Application**	**Interface Standard**	**Required Settings**	**Version**	**Effective Date**
Electronic Mail	Microsoft Outlook	NASA-STD-28015, IMAP4, SMTP, IMAP over SSL/TLS, MAPI over HTTPS	Configured for access to NOMAD	2007 SP1	April 1, 2009
Calendaring	Microsoft Outlook as implemented by NOMAD	iCalendar (RFC 2445)[4]		2007 SP1	April 1, 2009
Instant Messaging	Windows Messenger	SIP	Enterprise LCS Settings as implemented by NOMAD	5.1.x	June 24, 2008
	Pidgin	XMPP	NASA Jabber Service	2.4.x	June 24, 2008
PDF Viewer	Adobe Acrobat Reader	PDF File		8.1.x	June 24, 2008
Java	Java run-time environment			Java 6	October 1, 2008
Audio/video player	Apple QuickTime Player	Various Multimedia	Default for Quicktime formats	7.4.x	June 24, 2008
	Adobe Shockwave Player	Adobe Director Apps	Browser Plug-in	11.0.x	June 24, 2008
	Adobe Flash Player	Flash SWF		9.0.x	June 24, 2008
	Microsoft Windows Media Player	Windows Media Files	Default for all supported formats	11.0.x	June 24, 2008
	Real Player Enterprise	Real Streaming Media	Enterprise Version Only	11.x	June 24, 2008
Access to centrally served Windows applications	Citrix ICA Client	Citrix ICA Protocol		10.1.x	June 24, 2008
Electronic Forms	FileNet Desktop E-Forms	See Section 3.5	NASA Distribution Center	4.2	June 24, 2008

[4] This standard provides limited interoperability

3.3.2 Client Reference Configuration for Mac OS X

Client Reference Configuration for Mac OS X					
Functionality	**Application**	**Interface Standards**	**Required Settings**	**Version**	**Effective Date**
Operating System	Mac OS X		CIS Benchmarks	10.5.x	April 1, 2009
Firewall	Apple Firewall		Allow essential services Enable firewall logging Enable Stealth Mode[5]		April 1, 2009
Smartcard authentication	ActivIdentity ActivClient	ActivIdentity proprietary	HDI specified settings[6]	3.1	October 1, 2009
PKI	Entrust Entelligence			7.2	June 24, 2008
Trusted CA Certificates	See Section 3.6	X.509			June 24, 2008
Anti-virus	Symantec Antivirus Enterprise			10.2.x	December 2008
Anti-Malware	Symantec Antivirus Enterprise			10.2.x	December 2008
Data at Rest Encryption	SafeBoot		Configured to use central policy and key escrow service	Not Available	Not Available
Web Browser	Mozilla Firefox	W3C and industry standards, including the following: HTML 4.01 XHTML 1.0 CSS 2 (Cascading Style Sheets) ECMAscript (JavaScript) capability to run Java 2 applets, SSL version 2 and 3, TLS 1.0		2.0.x	June 24, 2008
	Apple Safari			3.1.x	June 24, 2008
Java	Java run-time environment			Java 6	October 1, 2008
Office Automation	Microsoft Office for Mac			2008	April 1, 2009
Word Processing	Microsoft Word	Microsoft Word 97-2003 document format	Configure to use Word 97-2003 file format by default	2008	April 1, 2009
Spreadsheet	Microsoft Excel	Microsoft Excel 97-2003 document format	Configure to use Excel 97-2003 file format by default	2008	April 1, 2009
Presentation	Microsoft PowerPoint	Microsoft Powerpoint 97-2003 document format	Configure to use Powerpoint 97-2003 file formats by default	2008	April 1, 2009
Electronic Mail	Microsoft Entourage	NASA-STD-28015, IMAP4, SMTP, IMAP over SSL/TLS	Configured for access to NOMAD	2008	April 1, 2009
	Apple Mail		Integration with NOMAD limited to email only	Current Mac OS X	June 24, 2008

[5] Vendor terminology for these settings
[6] See Section 3.4.6 for additional information.

Client Reference Configuration for Mac OS X					
Functionality	**Application**	**Interface Standards**	**Required Settings**	**Version**	**Effective Date**
Calendaring	Microsoft Entourage as implemented by NOMAD	iCalendar (RFC 2445)[7]	Configured for access to NOMAD	2008	April 1, 2009
Instant Messaging	Microsoft Messenger	SIP	Enterprise LCS Settings as specified by NOMAD	6.0.x	June 24, 2008
	Apple iChat	XMPP	NASA Jabber Service settings	Bundled	June 24, 2008
Patch Reporting	PatchLink (Update)	Lumension proprietary	Configuration for Server info	6.4.x	June 30, 2008
Audio/video player	Apple QuickTime Player	Various Multimedia	Default for all supported formats	7.4.x	June 24, 2008
	Adobe Shockwave Player	Adobe Director Apps	Browser Plug-in	11.0.x	June 24, 2008
	Adobe Flash Player	Flash SWF		9.0.x	June 24, 2008
	Telestream Flip4Mac WMV	Windows Media Files	Default for Windows Media	2..2.x	June 24, 2008
	RealPlayer	Real Streaming Media		10.x	June 24, 2008
PDF Viewer	Adobe Acrobat Reader			8.1.x	June 24, 2008
Access to centrally served Windows applications	Citrix ICA Client			10.00.x	June 24, 2008
Electronic Forms	FileNet Desktop E-Forms	See Section 3.5	NASA Distribution Center	4.2	June 24, 2008

[7] This standard provides limited interoperability

3.3.3 Client Reference Configuration for Linux

Client Reference Configuration for Linux					
Functionality	**Application**	**Interface Standards**	**Required Settings**	**Version**	**Effective Date**
Operating System	Red Hat Enterprise Linux Desktop with Workstation option		CIS Benchmarks	5.1 or later	June 24, 2008
	SuSE Linux Enterprise Desktop		CIS Benchmarks	10.3 or later	June 24, 2008
Firewall	Bundled		Control inbound and outbound connections enabled by default	Bundled	June 24, 2008
Smartcard authentication	ActivIdentity ActivClient	ActivIdentity Proprietary	HDI specified[8]	Not Available	Not Available
PKI	Entrust			Not Available	Not Available
Trusted CA Certificates	See Section 3.6	X.509			June 24, 2008
Anti-Virus	F-Prot Anti-Virus			6.0.x	June 24, 2008
Anti-Malware	F-Prot Anti-Virus			6.0.x	June 24, 2008
Data at Rest Encryption	SafeBoot		Configured to use central policy and key escrow service	Not Available	Not Available
Patch Reporting	PatchLink (Update)	Lumension Proprietary	Configuration for Server info	6.4.x	June 30, 2008
Web Browser	Mozilla Firefox	W3C and industry standards, including the following: HTML 4.01 XHTML 1.0, CSS 2 (Cascading Style Sheets) ECMAscript (JavaScript) capability to run Java 2 applets, SSL version 2 and 3 supporting the requirements of NASA-STD-2820, *Encryption and Digital Signature Standards*.		2.0.x	June 24, 2008
Office Automation	OpenOffice	Microsoft Office 97-2003 file		2.4.x	June 24, 2008
Word Processing	OpenOffice Writer	Microsoft Word 97-2003 file	Configure to use Microsoft Word 97-2003 file by default	2.4.x	June 24, 2008
Spreadsheet	OpenOffice Calc	Microsoft Excel 97-2003 file	Configure to use Microsoft Excel 97-2003 file by default	2.4.x	June 24, 2008
Presentation	OpenOffice Impress	Microsoft Powerpoint 97-2003 file	Configure to use Microsoft Powerpoint 97-2003 file by default	2.4.x	June 24, 2008
Electronic Mail	Thunderbird	NASA-STD-28015, IMAP4, SMTP, IMAP over SSL/TLS	Configured for access to NOMAD	2.0.x	June 24, 2008

[8] See Section 3.4.6 for additional information.

Client Reference Configuration for Linux					
Functionality	**Application**	**Interface Standards**	**Required Settings**	**Version**	**Effective Date**
Calendaring	NOMAD Outlook Web Access	iCalendar (RFC 2445)[9], HTTPS	Web Browser	2.x	June 24, 2008
Instant Messaging	Not Available	SIP	Enterprise LCS Settings as specified by NOMAD		
	Pidgin	XMPP	NASA Jabber Service settings	2.4.x	June 24, 2008
Java	Java run-time environment			Java 6	June 24, 2008
Audio/video player	Mplayer	Multimedia	Default for supported formats	1.0	June 24, 2008
	Adobe Flash Player			9.0.x	June 24, 2008
	RealPlayer	Real Streaming Media		11.x	June 24, 2008
PDF Viewer	Adobe Acrobat Reader			8.1.x	June 24, 2008
Access to centrally served Windows applications	Citrix ICA Client	Citrix ICA		10.0.x	June 24, 2008
Electronic Forms	FileNet Desktop E-Forms			Not implemented at NASA	

[9] This standard provides limited interoperability

3.4 Additional Client Reference Configuration Guidance

3.4.1 Office Automation Applications

For interoperability with older versions of Microsoft Office, the default file formats for Microsoft Office 2007, Microsoft Office 2008 for Mac, and OpenOffice on Linux systems should be changed to use the older Microsoft Office 97-2003 formats by default rather than the new ISO Standard Open XML formats. In April 2009, the Open XML file formats will become the standard.

Microsoft Office 2007 Standard Edition (or better) is approved for deployment on all interoperable Microsoft Windows systems. As of April 2009, all interoperable Microsoft Windows systems must be running Office 2007.

Microsoft Office 2008 for Mac (Standard Edition) is approved for deployment on all interoperable Mac OS X systems. As of April 2009, all interoperable Mac OS X systems must be running Office 2008. Note: Office 2008 discontinues support Visual Basic for Applications.

OpenOffice is approved for deployment and use on all Linux platforms and supports the standard Microsoft Office 97-2003 file formats. Documents created with Microsoft Office do not always render perfectly in OpenOffice, and vice versa.

3.4.2 Electronic Messaging

NASA has implemented an enterprise-wide electronic messaging service known as NOMAD. This service provides integrated email, calendaring, scheduling, contact management, and instant messaging. All interoperable desktops are required to be configured to access this environment.

Note that while NOMAD is based upon open standards and can support stand-alone email clients that adhere to the defined interface standards of the Client Reference Configurations, utilizing such clients limit end user interoperability, may not be supported by NOMAD, and may result in future inability to participate in the enterprise messaging environment.

Supported Messaging Clients

Windows:	Microsoft Outlook
Mac OS X:	Microsoft Entourage and Apple Mail
Linux:	Mozilla Thunderbird

Apple Mail does not support the NOMAD calendar and scheduling environment and should only be utilized when such integration is not required. NOMAD recommends the use of Microsoft Entourage which provides full integration and will receive priority engineering support.

Additional clients which conform to the interface standards may be used as point solutions where interoperability might otherwise not be available.

The selection of mail clients will continue to promote secure access to commercial and partner email services in support of extra-Agency (non-NOMAD) collaborative activities.

3.4.3 Web browser

Internet Explorer 7 for Windows was approved for deployment on NASA desktops in July 2007 (NASA-STD-2804K). IE7 remains a NASA standard browser and should continue to be

installed on interoperable Windows systems. To prepare for compliance with FDDC settings, by November 2008 all interoperable Windows systems must be running IE 7. An alpha version of Internet Explorer 8 is now available for testing. Upon its release, Internet Explorer 8 will be evaluated for interoperability and a deployment timeline established.

Firefox 2.0.x remains the standard for Windows, Macintosh and Linux systems. Firefox 3 is now in Beta 5 release and is expected to be generally released shortly. Upon its release, Firefox 3 will be evaluated for interoperability and a deployment timeline established.

Safari 3.1.x is the standard for all interoperable Macintosh systems. The use of Safari on Windows is not supported.

3.4.4 PatchLink

For current information on the Patchlink Agent, including specific version levels, please refer to the Agency Security Update Service (ASUS) web site at https://patches.ksc.nasa.gov/

Patchlink 6.4 with a SCAP-validated FDCC reporting module will be deployed throughout the enterprise as soon as it is available. Deployments must be completed in time to conduct the July 31, 2008 FDCC compliance data call.

3.4.5 Data at Rest (DAR) Encryption

NASA has purchased a suite of software from McAfee/SafeBoot to provide encryption for data at rest. This software is compliant with federally mandated requirements for encryption of sensitive data on mobile devices (including laptops and removable media). Licenses will be made available to all NASA employees and onsite contractors. All interoperable computers are required to implement this encryption technology. For more information see http://etads.nasa.gov/ERT

3.4.6 Smart Card Middleware

The Emerging Technology and Desktop Standards Group will work with the relevant teams to identify software required for smart card use and authentication on as many operating systems as possible.

Note that the components identified in Client Reference Configuration will make NASA systems "smart card ready". However, Centers will still be required to implement appropriate Agency infrastructure to actually enable smart card authentication. Additional details about smart card middleware, such as specific versions and information on additional platform support, will be provided as they become available. See http://etads.nasa.gov/HDI for status.

3.5 Operating System Standards, Timelines, and Compliance Dates

3.5.1 Microsoft Windows XP

Windows XP Professional SP2 remains the standard version of Windows for the agency interoperable computing environment.

Windows XP SP3 was released May 6, 2008 and is approved for immediate deployment. Service Pack 3 is primarily a roll up of existing security enhancements and Hotfixes with no end user feature or interoperability impacts.

Windows XP Home Edition and Windows XP Media Center Edition shall not be deployed.

All Windows XP systems must be compliant with FDCC configuration settings by April 2009

Windows XP reaches the end of Microsoft mainstream support in April 2009 and should be removed from all interoperable Windows systems by January 2010

3.5.2 Microsoft Windows Vista

Windows Vista (Ultimate or Enterprise edition) deployments may begin after October 1, 2008 and must be completed by January 2010.

The current Vista Service Pack is SP1. Deployments should be implemented using the most recent patches and service packs available from Microsoft.

It is permissible to deploy Vista on a limited basis where required, such as in the event that new hardware cannot be supported by XP.

All Vista deployments must be compliant with FDCC configuration settings.

3.5.3 Microsoft Windows 64-bit

Windows XP Professional x 64 Edition is specified as the standard version of Windows 64 bit for the agency interoperable computing environment and may be deployed where necessary, subject to the Windows XP Client Reference Configuration.

Vista 64 deployments must adhere to the Microsoft Windows Vista timeline in Section 3.5.2

3.5.4 Mac OS

Mac OS X 10.4 is the currently supported operating system on all interoperable Macintosh systems. Older versions should be removed from the environment. As always, the operating system must be kept up-to-date with vendor patches. At the time of this writing, Mac OS X 10.4.11 is the current maintenance release.

General deployment of Mac OS X 10.5 is currently approved. Mac systems which currently require 10.5, are the Mac Pro -8 core, MacBook, MacBook Pro and MacBook Air. At the time of this writing, Mac OS X 10.5.3 is the current maintenance release.

Mac OS X 10.4 should be removed from al NASA systems by April, 2009.

Users of IEMP applications are cautioned that support for OS X 10.5 is currently not scheduled to begin until October 2008.

3.5.5 Linux/x86 and x86-64

UNIX and Linux systems with no interoperability requirement do not need to comply with the interoperability requirements in this standard. Such systems would include special-purpose

computers such as name servers, compute servers, data acquisition systems, special software development workstations, or other components of the overall computing infrastructure.

Several product standards are not available for any Linux or UNIX system. In order to comply with this standard, interoperable desktops must have some way to access these products. It is recommended to use the Citrix ICA client to connect to a Microsoft Windows application server.

Two Linux distributions are supported for use on interoperable desktops:

Red Hat Enterprise Linux Desktop 5 with Workstation option:

https://www.redhat.com/rhel/desktop/

SuSE Linux Enterprise Desktop 10

http://www.novell.com/products/desktop/

3.5.6 Other UNIX

The following UNIX systems are supported in the NASA interoperable computing environment. Generally, both the current version and prior version of the operating system are acceptable. However, the older version of the operating system must continue to be supported by the vendor, and like all systems, must be kept current with security patches.

3.5.6.1 Sun Solaris/SPARC, x86, and x86-64

Solaris is at version 10. Information about supported Solaris releases may be found at:

http://www.sun.com/software/solaris/faqs/general.jsp#releases

3.5.6.2 IBM AIX/POWER

AIX 5L 5.2 and 5.3 are current. AIX versions are described at:

http://www-1.ibm.com/servers/aix/os/index.html

3.5.6.3 HP HP-UX/PA-RISC

HP-UX 11i v2 is current. The HP-UX 11i web page is at:

http://www.hp.com/products1/unix/operating/index.html

3.6 Electronic forms

Agency requirements for a forms product include the ability to provide access to all NASA employees requiring access to forms (including filler operation across all NASA standard desktop platforms), the capability to enhance NASA business processes through intelligent functionality, ease of use, and an array of functional and operational capabilities.

Since an open application program interface standard for data interchange among forms products has not yet been adopted or approved by any acknowledged standards body, a

product-level selection was warranted. After an evaluation of commercial products, FileNet Desktop eForms was found to comply with all key requirements. Other products which meet the requirements and interoperate with the FileNet product may be used via the waiver process.

Agency-level forms used for data collection with an official assigned number must be FileNet forms. Center unique versions of these agency forms should not be created or used.

NASA has purchased an Agency agreement for the use of FileNet Desktop eForms to allow all NASA centers, recognized partners, qualified contractors/service providers, and the general public the use of the product to complete forms when doing business with NASA. This includes center-specific forms, as well as other forms needed in the process of doing business.

Agency forms and software downloads are available through the NASA Electronic Forms (NEF) website http://nef.nasa.gov. The NEF website is the central repository for all forms used within NASA (NASA Forms, Standard Forms, Optional Forms, Center-specific forms, etc.), and is available to all internal users and external partners. For the purpose of form distribution an Agency distribution center profile has been created to allow access to Agency forms. All forms users should have the NEF distribution center profile, in addition to all of the profiles established for access to center-specific, and contractor maintained form collections. These profiles are maintained and distributed through the NEF website.

3.7 Additional X.509 root certificates

There are normally multiple local trusted Certificate Authority (CA) certificate stores in addition to those supplied by the operating system vendor: including, but not limited to, Java, Mozilla Thunderbird, and Mozilla Firefox.

On Windows XP and Mac OS (and on other systems where it is feasible to do so), the following X.509 root certificates must be installed as trusted roots in the local certificate stores:

- NASA Data Center Certificate Authority
- NASA Legacy Certificate Authority
- NASA Operational Certificate Authority (NOCA) from http://newlondon.arc.nasa.gov
- Federal Bridge Certificate Authority
- U.S. Treasury roots from http://newlondon.arc.nasa.gov

3.8 Operating System Configuration Requirements

The Federal Information Security Management Act (FISMA) requires all Federal agencies to utilize a consistent set of operating system and application configuration guidelines.

The National Institute of Standards (NIST) Security Content Automation Program (SCAP) has, with Microsoft collaboration, produced a set of security configurations for desktop Microsoft Windows XP and Vista systems. These configurations are known as the Federal Desktop Core Configurations. The Office of Management and Budget (OMB) has mandated that Federal Agencies use the FDCC settings without alteration, and that all future contractual IT support and procurements certify that they will operate with the mandated settings, in the following memoranda:

M-07-11 *Implementation of Commonly Accepted Security Configurations for Windows Operating Systems*

M-07-18 *Ensuring New Acquisitions Include Common Security Configurations*

Operating systems for which FDCC settings are not currently available will continue to use the CIS Benchmarks. Agency-wide guidance is provided in the NASA CIO letter, Center for Internet Security (CIS) Consensus Benchmarks, dated 02 September 2004 in which Centers are directed to use the Center for Internet Security's (CIS) Consensus Benchmarks. Technical guidance regarding specific levels of CIS Benchmarks for NASA systems is available at:

http://etads.nasa.gov/ASCS

3.9 Section 508 Compliance Requirements

Software products procured after June 21, 2001 must be in conformance with Section 508 of the Rehabilitation Act. Complete information and guidance on addressing Section 508 requirements is available at:

http://www.section508.nasa.gov

The NASA Emerging Technologies and Desktop Standards team has evaluated vendor-supplied Voluntary Product Accessibility Template (VPATs) for Windows XP, Windows Vista, Mac OS X Tiger, Office 2003, Office 2004, Office 2007, and Firefox 2, and believes that they satisfy the Section 508 requirements to an acceptable degree.

3.10 FIPS 140-2 Compliance Requirements

NASA will adhere to the guidelines and recommendations of the National Institute of Standards and Technology as required by the Federal Information Security Management Act, particularly as they apply to computer security and encryption technology for desktop hardware and software. More specifically, NASA will comply with Federal Information Processing Standards (FIPS) 140-1 and 140-2 as applicable, validated encryption modules become available.

NASA application developers and service providers are reminded that whenever cryptographic-based security systems are used to protect sensitive information in computer systems, the cryptographic modules utilized must be FIPS 140-2 compliant as validated by NIST[10]. A current list of validated products can be found at:

http://csrc.nist.gov/cryptval/

[10] Federal Information Processing Standards Publication 140-2, *Security Requirements for Cryptographic Modules*

The following products mentioned in NASA-STD-2804 have been validated by a NIST-accredited testing laboratory and may be appropriate to protect sensitive information with cryptography under specific conditions:

Product	Validation Module	Certification	Comments
Microsoft Internet Explorer	Kernel Mode Cryptographic Module for Windows XP	#241	Single User Mode, FIPS 140-1
Microsoft Outlook	Outlook Cryptographic Provider	#110	Single User Mode, FIPS 140-1, S/MIME
Entrust PKI Software	Entrust Security Kernel Version 7.0	#308	FIPS 140-1, When operated in FIPS Mode
F-Secure SSH	F-Secure® Cryptographic Library™ for Windows	#437	FIPS 140-2, When operated in FIPS Mode, Single User Mode.
OpenSSL	OpenSSL FIPS Object Module (1.1.2)	#918	
Citrix ICA Client for Windows	Kernel Mode Cryptographic Module for Windows XP	Not Validated	Uses MS Windows FIPS Crypto Module
SafeBoot Client	Diffie-Hellman	#506	FIPS 140-2, When operated in FIPS Mode
Mozilla	Network Security Services (NSS)	#815	FIPS 140-2, When operated in FIPS Mode
Entrust PKI Software	I Version 8.0	#797	FIPS 140-2, When operated in FIPS Mode

3.11 Energy Management

In order to comply with Executive Order 13423, printers, laptops and desktop systems must be configured to use energy-saving settings.

3.11.1 Computers

Requirements:

- Displays shall be set to sleep after 15 minutes of idle time
- Systems shall go to sleep after 60 minutes of idle time

Wake-on-LAN functionality may be useful for administrators to wake the systems in order to perform maintenance.

Generally, the level of sleep should be as effective as possible at saving power, given the constraints of the environment. The S3 power savings mode (keep memory contents intact, and listen for a wake signal) is suitable in most circumstances.

Servers and other special-purpose systems are exempted from this requirement.

3.11.2 Printers

Where possible, duplex printing should be utilized. Networked printer drivers should be configured to utilize duplex printing by default.

4 ADDITIONAL SOFTWARE TABLES

4.1 Table of Optional Software

The following table contains optional useful functionality that is not required for interoperability. These software applications and utilities can be made available to end users upon request or distributed with standard enterprise images to support interoperability. Where practical, it is recommended that these tools be used rather than similar tools that address the same function. This table often identifies software that will eventually be included in the Client Reference Configurations.

Function	Windows	Mac OS X	Linux
3279 client	QWS3270	tn3270	tn3270
Advance file archive extractor/creator	WinZip 9	bundled	bundled
Real A/V Player	RealPlayer 10	RealPlayer 10	RealPlayer 10
Remote access to Windows systems	MS Remote Desktop Connection	MS Remote Desktop Connection	bundled
X window system server	Exceed	Apple X11	bundled
PostScript previewer	Ghostscript	bundled	bundled
PDF creator	Adobe Acrobat, Pro	Adobe Acrobat Pro	Scribus
PDF writer/converter	PrimoPDF, MS Office 2007 PDF plug-ins	bundled	bundled
Project Management	MS Project 2007	OmniPlan	Intellisys Project Desktop

4.2 Table of Agency Required Software

The following table summarizes software that must be installed on all Agency desktop systems, regardless of their interoperability requirements.

This software is included in the Client Reference Configuration.

Function	Windows	Mac OS X	Unix
FISMA compliance	FDCC	CIS Benchmarks	CIS Benchmarks
Patch reporting	Patchlink	Patchlink	Patchlink
Anti-Virus	Symantec Anti-Virus Enterprise Edition	Symantec Anti-Virus Enterprise Edition	F-Prot Anti-virus
Data-at-Rest Encryption	SafeBoot	Safeboot	Safeboot
HSPD12	ActivClient	ActivClient	ActivClient

5 REVIEW AND REPORTING REQUIREMENTS

5.1 Interoperability Maintenance Reporting

Upon request, Center CIO's will provide the NASA CIO with a summary report, outlining the status of minimum interoperability access for each NASA employee.

5.2 Interoperability Reporting

Each Center CIO will establish the necessary processes and tools, both manual and automated, to report on an annual basis to the NASA CIO the hardware and software configuration of all workstations at their respective Centers. These data will contain sufficient information to ascertain if the workstation supports NASA employees or is Government-furnished equipment to a contractor, whether the equipment is required to be interoperable, and a description of the hardware architecture/environment. The report will specify the number of NASA employees that do not have access to interoperable workstations.

5.3 Basic Interoperability Standards Maintenance

This standard, and its companion, NASA-STD-2805 Minimum Hardware Configurations, are maintained on behalf of the NASA CIO by the Emerging Technology and Desktop Standards group. Together, these standards define the software, hardware, and configurations necessary to ensure basic interoperability within the NASA information technology computing infrastructure.

This standard will be reviewed and updated on an as-required basis, not to exceed 12-month intervals. Participation in the revision process is open to all NASA employees. Details on how to be alerted of changes to the standards and/or comment on proposed updates can be found at:

http://desktop-standards.nasa.gov

This site also maintains interim guidance, position papers, software and hardware reviews, recommendations and other documentation intended to promote standardized basic interoperability.

6 DURATION

6.1 Duration

This standard will remain in effect until canceled or modified by the NASA CIO.

7 SUPPORTING DOCUMENTS

7.1 Supporting Documents

Supporting documents and additional information related to this standard may be found at:

http://desktop-standards.nasa.gov